

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Promoting Spectrum Access for Wireless)	GN Docket No. 14-166
Microphone Operations)	
)	
Amendment of Part 15 of the Commission's)	ET Docket No. 14-165
Rules for Unlicensed Operations in the Television)	
Bands, Repurposed 600 MHz Band, 600 MHz)	
Guard Bands and Duplex Gap, and Channel 37,)	
and)	
)	
Amendment of Part 74 of the Commission's)	
Rules for Low Power Auxiliary Stations in the)	
Repurposed 600 MHz Band and 600 MHz Duplex)	
Gap)	
)	
Expanding the Economic and Innovation)	GN Docket No. 12-268
Opportunities of Spectrum Through Incentive)	
Auctions)	

COMMENTS OF SHURE INCORPORATED
IN RESPONSE TO FURTHER NOTICE OF PROPOSED RULEMAKING

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SUMMARY

Shure strongly supports the Commission's proposal in the Further Notice to establish a means by which smaller-scale wireless professional production events may secure protection from interference by making Part 74 licenses available to wireless microphone operators that have both the need for professional quality, interference-free operations and the expert capability to assume the responsibilities of a Part 74 licensee.

In earlier updates to the Part 74 licensing rules, the Commission recognized that interference protection is necessary for wireless microphones in large productions where 50 or more devices are used to meet rigorous audience requirements for high-quality professional audio. However, following the Commission's decision to eliminate access to interference-free spectrum using the geolocation database *and* the decision to eliminate two reserved channels identified exclusively for wireless microphone use, unlicensed wireless microphone operators facing demands for professional grade audio in a smaller production environment have no adequate means to secure interference protection in the TV Band. Absent a rule modification, the focus of many important events remains at risk: the political candidate at Town Hall meetings on the campaign trail, the CEO at an important product launch or investor meeting, the university chancellor delivering a commencement address, or the major musical artist performing in an intimate venue, to name a few.

Shure supports the proposal to amend the Part 74 licensing eligibility rule defining "Professional sound company" and "Venue owner or operators" to include wireless microphone operators that "can demonstrate a particular need for, and the capability to provide, professional, high-quality audio that is integral to their events or

productions.” Shure proposes that applicants should qualify for a Part 74 licenses upon (a) demonstration of an audience’s expectation for professional-grade audio; and (b) certification that an applicant has personnel with the requisite training, knowledge, and expertise with respect to skills necessary to properly operate a professional audio system, avoid interference to others, coordinate with other spectrum users, and assume the responsibilities of a Part 74 licensee and adhere to all applicable Commission rules and policies. Shure suggests that applicants affirm that they have sufficient knowledge and training with respect to several core principles of wireless microphone operations.

Adoption of the proposed rule, with the amendments suggested by Shure, would serve the public interest by enabling smaller scale wireless microphone operators with audio needs identical to professional wireless microphone operators supporting larger scale events to obtain a Part 74 licenses and register frequencies in the geolocation database to protect their operations from co-channel operations.

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Shure Incorporated (“Shure”), by its undersigned counsel, hereby submits these comments in response to the Federal Communications Commission (“FCC” or “Commission”) Further Notice of Proposed Rulemaking (“FNPRM”) in the above-captioned proceeding.¹ Shure appreciates the Commission’s efforts in response to its Petition for Reconsideration,² and strongly supports the reexamination of the rule

¹ *In the Matter of Promoting Spectrum Access for Wireless Microphone Operations, et al.*, Order on Reconsideration and Further Notice of Proposed Rulemaking, GN Docket Nos. 14-166, 12-268, ET Docket No. 14-165, 32 FCC Rcd 6077, 6119 *et seq.* (2017) (“FNPRM”).

² *In the Matter of Promoting Spectrum Access for Wireless Microphone Operations, et al.*, Petition on Reconsideration of Shure Incorporated, at 13 (filed Dec. 23, 2015) (“Petition for Reconsideration”).

requiring wireless microphone users to meet a 50 device threshold to be eligible to obtain a Part 74 license and to register for interference protection from white space devices when operating in the TV bands and to operate in 600 MHz duplex gap frequencies available only to Part 74 licensees.³ Shure looks forward to working with the Commission and industry stakeholders to define rules that strike “an appropriate balance in expanding licensee eligibility where there is a clear need for professional high-quality audio for particular events/productions, while ensuring that spectrum is shared effectively with existing wireless microphone licensees and remains available for other uses.”⁴

I. INTRODUCTION AND BACKGROUND

Shure is a respected U.S.-based manufacturer of high-quality audio equipment and a global leader in innovative audio electronics, including high-quality wireless microphones⁵ and other professional audio products⁶ classified as low-power auxiliary

³ See FNPRM, 32 FCC Rcd at 6117, ¶ 77.

⁴ See *id.*, 32 FCC Rcd at 6124, ¶ 89.

⁵ “Wireless microphones,” as used herein, includes a variety of audio devices authorized under Part 74 and/or Part 15 of the Commission’s Rules as secondary users of locally unoccupied television channels. In addition to microphones, this equipment includes in-ear monitors, wireless intercoms, wireless assist video devices (“WAVDs”) and wireless cueing (“IFB”) systems. This working definition is consistent with the definition of wireless microphone adopted by the Commission. See *Amendment of Part 15 of the Commission’s Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and Amendment of Part 74 of the Commission’s Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, ET Docket No. 14-165, GN Docket No. 12-268, Order, 30 FCC Rcd 9551, 9588, ¶ 95 (2015) (“*TV Bands Part 15 R & O*”) (defining a wireless microphone as “a device that converts sound into electrical audio signals that are transmitted using radio signals to a receiver which converts the radio signals back into audio signals that are sent through a sound recording or amplifying system.”).

⁶ “Professional audio” microphones are used as a medium for transmission of multimedia and artistic content, and have corresponding and unique performance requirements. They must capture full audio range, have less than three (3) milliseconds of transmission latency (for some applications less than one (1) millisecond), and have reliability that meets or exceeds the expectations of a wired microphone user. These performance requirements necessitate a wider emission and require adequate, clean spectrum.

devices authorized under Part 74 of the Commission’s Rules to operate on a secondary basis in the TV broadcasting spectrum.⁷

Shure has participated extensively in various Commission proceedings grappling with the existing and growing spectrum needs of wireless microphones in the face of competing demands for spectrum from other new users. In those proceedings, the Commission radically altered the use of the UHF spectrum band by repurposing a significant amount of spectrum previously available for wireless microphones to high-power wireless broadband and implemented new sharing rules to introduce a new class of unlicensed devices (“white space devices” or “WSDs”).⁸

Shure has consistently advocated for rules that reflect the distinct and demanding nature of wireless microphone operations, particularly those used in professional applications. Wireless microphone operators – and the millions of people experiencing the live performances or otherwise consuming the content made possible by wireless microphones – require reliable, clear, interference-free spectrum that makes low latency, real-time audio possible.

⁷ Wireless microphones have historically operated on a secondary basis, principally in the UHF television bands pursuant to Subpart H of Part 74. *See* 47 C.F.R. §§ 74.801-74.882. Certain wireless microphone applications have also been accommodated on a secondary basis in the VHF television bands, in a narrow Part 90 VHF allocation, and in certain Industrial, Scientific and Medical bands under Part 15 unlicensed rules.

⁸ Those proceedings also implemented rule changes that migrated wireless microphones out of the 700 MHz band to make way for high power wireless carrier use, implemented Part 15 rules for a new class of unlicensed wireless microphones, identified supplemental spectrum for wireless microphones use and the reform and update of the Commission’s licensing rules to reflect the changing use and the current state of wireless microphone operations. *See, e.g., Revisions to rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, et al.*, Report and Order and Further Notice of Proposed Rulemaking, 25 FCC Rcd 643 (2010); *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices below 900 MHz and in the 3 GHz Band*, Second Memorandum Opinion and Order, 25 FCC Rcd 18661 (2010); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567 (2014).

Today, wireless microphones play a critical role in countless productions important to many aspects of American life.⁹ While wireless microphones can be found in many ordinary daily uses, professional-grade use of wireless microphones has expanded significantly and is now a fundamental part of the production “infrastructure” of live and recorded performances, presentations, and programming. In addition to the Commission’s originally recognized Part 74 license eligible use in broadcasting and film production, wireless microphones today provide critical support to productions in a wide range of sectors including news gathering, theater, music, sports, worship, civic events, transportation infrastructure, and education. In many of these applications, the public has come to expect and demand extremely high-quality audio regardless of the size and complexity of the production or the number of microphones utilized.

II. THE PROPOSED PART 74 RULE MODIFICATION SHOULD BE ADOPTED TO PROVIDE NECESSARY INTERFERENCE PROTECTION TO SMALLER SCALE WIRELESS MICROPHONE USERS THAT USE FEWER THAN 50 DEVICES

In 2014, in the *TV Bands Wireless Microphones Second R&O*, the Commission updated the Part 74 rules to reflect more current uses of wireless microphones and “provided for a limited expansion of eligibility under Part 74, Subpart H, to include professional sound companies and venues that routinely use 50 or more wireless

⁹ These productions include, for example, major broadcast events (*e.g.*, the national political conventions and campaign coverage, the upcoming Grammy and Oscar awards shows, etc.), major music productions (*e.g.*, the 2017 Coldplay tour), theater (*e.g.*, matinee and nightly shows on Broadway and Cirque du Soleil in Las Vegas and elsewhere), sports (*e.g.*, 2017 NFL Super Bowl and play-off games, college basketball) productions, large houses of worship (*e.g.*, Lakewood Church, Second Baptist Church), business conventions (*e.g.*, 2017 CES) and major product launches. These and similar events occur weekly and sometimes daily and are extremely wireless-microphone intensive. In some cases, hundreds of wireless microphone channels are necessary to support such productions.

microphones for major events/productions where use of such devices is an integral part of these events/productions.”¹⁰ With that rule change, those licensed wireless microphone users were able to “register with the white spaces databases to receive interference protection at specified locations when these events/productions are performed.”¹¹

Prior to the 2014 *TV Bands Wireless Microphones Second R&O*, although the Commission determined that unlicensed status was sufficient for a significant segment of wireless microphone users, the FCC correctly recognized that there are instances when a wireless microphone user that does not meet the 50 device threshold would have interference protection needs similar to a Part 74 licensee.¹² At that time, unlicensed wireless microphone users in need of interference protection could look to spectrum in which WSDs by rule could not operate, including two reserve channels for exclusive wireless microphone operation. Nonetheless, the Commission recognized that unlicensed users would still need interference protection in some cases and therefore established a process by which unlicensed wireless microphone users in need of interference protection – typically trying to meet audience expectations for high quality, interference-free professional audio – would be able to petition the Commission for protected status in the white spaces database on a case by case basis.¹³

¹⁰ FNPRM, 32 FCC Rcd at 6120, ¶ 79 (citing *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, Public Interest Spectrum Coalition, *Petition for Rulemaking Regarding Low Power Auxiliary Stations, Including Wireless Microphones, and the Digital Television Transition, Amendment of Parts 15, 74, and 90 of the Commission’s Rules Regarding Low Power Auxiliary Stations*, WT Docket Nos. 08-166 and 08-167 and ET Docket No. 10-24, Second Report and Order, 29 FCC Rcd 6103 (2014) (“*TV Bands Wireless Microphones Second R&O*”).

¹¹ *Id.* (internal citation omitted).

¹² See *Unlicensed Operation in the TV Broadcast Bands and Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz band*, ET Docket Nos. 04-186 and 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd 18661, 18674-75, ¶¶ 31-32 (2010).

¹³ *Id.*

Regrettably, not long after the extensive rulemaking in which this system was established, the Commission decided to eliminate it altogether. The decision to eliminate *both* the unlicensed database registration pathway *and* the two reserved wireless microphone channels, in anticipation of the TV Band repacking which would result from the 600 MHz Incentive Auction, left **no means for an unlicensed wireless microphone operator facing demands for professional grade audio to secure interference protection in the TV Band.**¹⁴ As a practical matter, for example, the Commission's action meant that the small theater that could not qualify as a Part 74 licensee because it does not routinely use 50 or more microphones had no option to ensure that its audiences would be able enjoy a performance free from interference that would, if it occurred, ruin the essential value and purpose of the performance. Similarly, protection would not be available for a political candidate at Town Hall meetings on the campaign trail, a CEO at an important product launch or investor meeting, a university chancellor delivering a commencement address, or a major musical artist performing in an intimate venue. All such wireless microphone uses involve "mission critical" applications that, to the event producers and technical crews, are fundamentally identical to those requiring 50 or more wireless links and in need of protection from interference similar to those of Part 74 licensees.

In response to Shure's Petition for Reconsideration and petitions filed by other parties seeking a way to address the needs of this segment of the wireless microphone user population, the Commission now proposes to revise the definitions of "large venue owner or operator" and "professional sound companies" that are eligible for Part 74

¹⁴ See *TV Bands Part 15 R & O*, 30 FCC Rcd at 9660, ¶ 266.

licenses under 47 C.F.R. § 74.832(a)(7) and (a)(8), respectively, to include “entities that have the need for professional high-quality audio for their events/productions.”¹⁵ Specifically, the Commission proposes to “define these terms to include *either* (a) wireless microphone users that routinely use 50 or more wireless microphones where the use is an integral part of major events or productions (as provided under existing rules) *or* (b) wireless microphone users that otherwise can demonstrate a particular need for, and the capability to provide, professional, high-quality audio that is integral to their events or productions.”¹⁶ Shure applauds the Commission’s efforts to reexamine its rules to address the needs of this important segment of the wireless microphone community and strongly supports the proposal to add a second prong of the Part 74 licenses eligibility rule for this purpose.

III. PART 74 ELIGIBILITY SHOULD EXTEND TO SMALLER SCALE WIRELESS MICROPHONE USERS WITH A NEED FOR PROFESSIONAL-GRADE AUDIO AND WITH THE REQUISITE SKILLSET TO OPERATE A PROFESSIONAL-GRADE AUDIO SYSTEM IN ACCORDANCE WITH THE COMMISSION’S RULES.

As a threshold matter, Shure supports the Commission’s case-by-case approach to expand Part 74 eligibility to professional sound companies or venue operators that either meet the 50 device requirement or who can otherwise demonstrate a legitimate need for, and capability to provide, professional, high-quality audio. Under the second prong of the Commission’s proposed rule, applicants should qualify for interference protection under Part 74 rules upon (A) demonstration of an audience’s expectation for professional-grade audio and (B) certification that an applicant has personnel with the requisite training,

¹⁵ FNPRM, 32 FCC Rcd at 6123, ¶ 84.

¹⁶ *Id.* ¶ 86 (emphasis added).

knowledge, and expertise with respect to skills necessary to properly operate a professional audio system, avoid interference with and otherwise coordinate with other spectrum users, and is prepared and able to assume the responsibilities of a Part 74 licensee and adhere to all applicable Commission rules and policies. This case-by-case approach is consistent with the Commission’s licensing approaches in other bands including in heavily used spectrum or spectrum in shared bands.

A. Audience Expectation of High-Quality, Interference-Free Audio Should Satisfy the Requirement that Applicants Demonstrate a “Particular Need” for Professional-Grade Audio

Shure maintains that a licensing eligibility rule that relies on the number of microphones in use is often not a good barometer for assessing the critical nature of audio production for important events or the criticality of protecting the wireless microphone operation from interference. Although welcomed, the Commission’s 2014 update of the wireless microphone licensing rules does not fully address high-priority events with smaller scale wireless audio requirements. In the absence of some other mechanism for these wireless microphone operators to gain reliable access to interference-free spectrum (and with greatly reduced options in the UHF spectrum), the proposed change is greatly needed and would serve the public interest. Shure agrees with the Commission’s proposal to allow certain non-profit or for-profit “theater, music, and performing arts organizations that do not meet this threshold but are otherwise able to demonstrate they have these ‘professional’ needs and capabilities to obtain a Part 74 license” to operate.¹⁷ However, there are many productions in the civic, cultural, corporate, education, and entertainment

¹⁷ *Id.* ¶ 85 (internal citation omitted).

sectors where fewer than 50 device frequencies are used, but the ability of the wireless microphone to operate without interference is absolutely critical to the event.¹⁸

Audio quality is critical to connecting with and engaging an audience. The Commission should find that a “particular need” for professional-grade audio exists where a Part 74 applicant makes a compelling demonstration that the intended audience has an expectation of high quality audio. As discussed in the examples provided above, such an expectation may be created in a number of settings to serve important entertainment, business, or informational objectives. In cases where fewer than 50 devices are utilized, applicants should provide a succinct narrative justification, including relevant details such as the “nature of the venue(s) and its wireless microphone operations, the need for professional, high caliber audio quality and reliability for its particular types of events/performances, the particular amount of spectrum access it needs, devices in use, and its ability to comply with the licensee’s responsibilities” including responsible spectrum management and the obligation to operate in a spectrally efficient manner¹⁹ for the Commission’s review.

With respect to “mixed use” venues, because applicants with fewer than 50 licensees must demonstrate both a “particular need” and the “capability to provide professional, high-quality audio,” Shure believes that there would be little risk of events

¹⁸ See Amendment of Part 15 of the Commission’s Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and Amendment of Part 74 of the Commission’s Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, ET Docket No. 14-165, GN Docket No. 12-268, Comments of Shure Incorporated, at 30 (filed Feb. 4, 2015).

¹⁹ *Id.* ¶ 87.

not meriting interference protection obtaining protected access to spectrum.²⁰ Part 74 venue licensees would have to certify that their protected uses are limited to those applied for and approved by the Commission (which purpose could be specified in the Part 74 license), and for uses only by particular employees or staff with the requisite qualifications as designated in the application.

B. Applicants Must Certify to the Commission That They Have the “Capability to Provide, Professional, High-Quality Audio”

To demonstrate professional capabilities, applicants should certify that that responsible staff will be on-site for the duration of the microphone use and they have the requisite expertise and skills necessary to properly operate a professional audio system in a spectrally efficient manner and avoid interference with, and otherwise coordinate with, other spectrum users, and are prepared and able to assume the responsibilities of Part 74 licensees, comply with geolocation database registration procedures and responsibilities, and adhere to all applicable Commission rules and policies. Specifically, Shure envisions that an electronic certification that accompanies the application would require applicants to affirm that they have sufficient knowledge and training with respect to (1) wireless microphone spectrum availability; (2) radiofrequency fundamentals; (3) antenna systems; (4) frequency coordination; and (5) operating authority limitations. By signing the electronic certification, applicants would attest that the statements listed in the application are true, complete, correct, and made in good faith.

Wireless Microphone Spectrum Availability. Applicants would be expected to have an understanding of the frequency ranges currently available for wireless

²⁰ See *id.* ¶ 86 (requesting comment on treatment of “mixed use” venues).

microphone use, particularly in light of significant changes to those frequencies in recent years. Applicants should be responsible for certifying that they are only operating equipment on currently permissible frequencies.

Radiofrequency Fundamentals. Applicants should certify that they have sufficient comprehension of radiofrequency operations to operate a wireless microphone system in accordance with manufacturer's instructions and in compliance with the Commission's rules. This foundational knowledge would include, for example, an understanding of the characteristics of analog and digital modulation schemes, transmitter and receiver operation, and diversity techniques.

Antenna Systems. With respect to antenna systems, the Part 74 applicants would be expected to be familiar with basic antenna characteristics (bandwidth, directionality, impedance, gain, etc.) and selection of the proper type of antenna (omnidirectional or directional) for the applicant's purposes.

Frequency Coordination. Applicants must be able to address system-to-system interactions including appropriate channel separation and intermodulation distortion (IMD) interference and manage outside interference issues vis-à-vis digital television, white space devices and out-of-band sources in compliance with the Commission's rules.

Operating Authority Limitations. Finally, Applicants should be aware of any priority users in the wireless microphone frequency bands they are utilizing and verify compliance with any associated technical or operating limitations or parameters under the Commission's rules.

IV. THE COMMISSION SHOULD PERMIT VENUE AND PROFESSIONAL SOUND COMPANY LICENSEES TO QUALIFY FOR LICENSES IN ALL BANDS THAT ARE AVAILABLE FOR PART 74 WIRELESS MICROPHONE LICENSEES

In addition to proposing to permit professional theater, music, and performing arts organizations that do not meet the 50 device threshold but meet the two-part test above to obtain a Part 74 license in the TV bands and to operate in the lower portion of the 600 MHz duplex gap, the Commission also proposes to permit these entities to qualify for a license in portions of the 900 MHz band, as well as in the 1435-1525 MHz and 6975-7125 MHz band, that also are available for Part 74 wireless microphone licensees, upon demonstrated need and ability to meet the necessary coordination and other requirements pertaining to each particular band.²¹ Shure agrees with the Commission that the risk of wireless microphone operations causing harmful interference to primary licensees in these bands is low given that they operate at “relatively low power over short ranges”²² and supports this proposal, as a general matter, if operation in these bands is required to meet the spectrum needs of the production and the proper coordination and permission procedures are followed.²³

V. ALTERNATIVE APPROACHES

Shure believes that the two-pronged approach discussed above would best meet the objectives of enabling smaller scale wireless microphone operations with professional audio needs to gain licensed status and secure protection for their operations. This case-by-case approach is consistent with the Commission’s licensing approaches in other

²¹ See FNPRM, 32 FCC Rcd at 6125, ¶ 90.

²² *Id.*

²³ Shure acknowledges that licensees would be subject to and required to comply with coordination procedures with AFTRCC and SBE that apply to all Part 74 licensees.

bands including in heavily used spectrum or spectrum in shared bands. Shure does not favor rule language that would condition license eligibility on a specific number of microphones used, number of seats in a venue, building size, or other similar metrics because such metrics do not serve as an adequate proxy for the need for interference protection and the ability and responsibility of the prospective licensee to meet its obligations under the Commission's Rules.

VI. CONCLUSION

Shure enthusiastically supports the Commission's efforts in this proceeding, and looks forward to contributing further input to address the needs of microphone users that operate on a smaller scale but nonetheless require interference protection. Shure looks forward to working with the Commission and industry stakeholders to develop a balanced approach that ensures that "spectrum is shared effectively with existing wireless microphone licensees and remains available for other uses" while providing interference protection for important smaller scale events.

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